

Attorney's Docket No.: 06618/379002 / CIT 2898

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Sarath Gunapala et al. Art Unit : 2815
Serial No.: 09/924,209 Examiner : Baumeister, B.
Filed : August 7, 2001
Title : QUANTUM WELL SENSOR HAVING SPATIALLY SEPARATED
SENSING COLUMNS (AS AMENDED)

Mail Stop AF

Commissioner for Patents
Washington, D.C. 20231

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RESPONSE

In response to the action mailed July 28, 2003,
reconsideration and allowance of the above-referenced
application are respectfully requested.

OFFICIAL

As an initial matter, formal drawings were mailed to the
Patent Office along with the response dated April 30, 2003. A
copy of the returned postcard for that filing is attached here
for reference. The postcard lists 2 sheets of formal drawings
as one of 3 items in that filing. As for FIG. 3, the white
serpentine region should represent the electric field
distribution in that region rather than the physical embodiment
of the contact layer 116 although the contact layer 116 is
located in that area. The undersigned suggests that "116" be

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removed. Upon approval by the Examiner, revised formal drawings will be submitted.

Claims 1-3, 5-8, and 10 stand finally rejected under 35 USC 103(a) over Choi '015 Chen in view of Chen. Applicants, however, respectfully traverse the rejections.

Choi '015 discloses cavities 251 with straight walls in stack S of quantum well layers of QGIP 220 (FIGS. 5, 6, 7, and 8). Such cavities 251 diffracts input light with normal incidence to allow for absorption by the quantum well layers in the stack S. The cavities 251 do not have optically absorbing quantum well layers and hence do not absorb light.

In contrast, Claims 1-3, 5-8, and 10 recite a plurality of quantum-well structures that are "arranged in columnar shapes, and spatially separated from one another by a gap which is electrically insulating." As illustrated in FIGS. 7 and 8 in Choi '015, the quantum well layers in the stack S are continuous with embedded cavities 251 (or 252) and are not arranged in separated column shapes. Therefore, Choi '015 fails to disclose such features.

In Claims 1-3, 5-8, and 10, each quantum-well structure in the columnar shape is to operate "to absorb radiation polarized perpendicularly to said quantum-well layers." In Contrast, each cavity shown in FIGS. 5-8 does not have the quantum well layers

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and thus does not absorb light. Therefore, Choi '015 fails to disclose this aspect of Claims 1-3, 5-8, and 10.

Claims 1-3, 5-8, and 10 further recite that opposing parallel side walls perpendicular to said substrate in each quantum-well structure form "an optical cavity therebetween." This optical cavity is formed of multiple quantum wells that absorb light and can reflect diffracted light between the opposing surfaces multiple times to increase the effective interaction length in the quantum well layers. This increases the optical absorption by the quantum-well layers inside each optical cavity. See, e.g., the original specification at pages 5-6.

The cavities in Choi '015, however, are hollow and do not have any quantum well layers. Therefore, Choi '015 fails to disclose this aspect of Claims 1-3, 5-8, and 10.

Chen discloses entirely different structures from Choi '015. Chen teaches formation of V grooves in quantum well layers to use the total internal reflection at the slanted side surfaces of the V grooves to change the polarization of reflected light relative to the quantum well layers. Hence, unlike Choi '015, Chen purposely use slanted side surfaces of the V grooves to achieve the total internal reflection without using the diffraction by gratings to alter the polarization of

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the normal incident light. FIG. 2 in Chen illustrates operation of such V grooves. Therefore, Chen fails to disclose features in Claims 1-3, 5-8, and 10 as mentioned above.

The Patent Office alleges a combination of Choi '015 and Chen would teach each feature in Claims 1-3, 5-8, and 10. This contention, however, fails to meet the requirements under 35 USC 103(a).

First, Choi '015 and Chen, as discussed above, use fundamentally different optical mechanisms to change the polarization of input light with normal incidence. Chen's structure cannot be modified to eliminate the V grooves and to have straight side surfaces because this modification would defeat Chen's goal of using the total internal reflections by the slanted side surfaces of the V grooves. Therefore, Choi '015 and Chen cannot be properly combined in the manner suggested by the Patent Office.

Second, none of Choi '015 and Chen, suggests in any way the optical cavity as recited in Claims 1-3, 5-8, and 10. The Patent Office fails to provide any support in Choi '015 and Chen for this recited feature. In the present invention, each of the quantum-well structures arranged in columnar shapes to have "opposing parallel side walls perpendicular to said substrate." Such opposing parallel side walls perpendicular to said

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substrate in each quantum-well structure form "an optical cavity therebetween." This optical cavity can reflect diffracted light between the opposing surfaces multiple times to increase the effective interaction length and thus the efficiency of absorption.

For the above reasons, Claims 1-3, 5-8, and 10 are distinctly patentable over Choi '015 and Chen.

Claims 4, 9, and 11 are also patentable over Choi'015/Chen and in further view of Choi '469 based on at least the above arguments. Also see arguments made in a prior response filed on April 30, 2003 with respect to Choi '469.

In summary, Claims 1-11 are patentable over the cited prior art and should be in full condition for allowance.

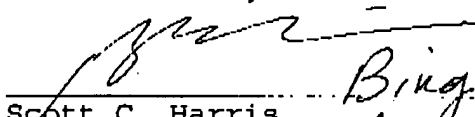
In view of the repetitive failures in providing the prima facie showing on the part of the Patent Office, Applicants concurrently file a Notice of Appeal on final rejection of Claims 1-11. An appeal brief will be timely filed at a later time.

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Please charge the \$55 one month extension of time fee, and
any other applicable charges or credits, to Deposit Account
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Respectfully submitted,

Date: November 26, 2003



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